

# Seattle Permits

— part of a multi-departmental City of Seattle series on getting a permit

## Solar Electric Systems

*Updated December 22, 2005*

This Client Assistance Memo (CAM) was developed jointly by the Department of Planning and Development (DPD) and Seattle City Light (SCL), who are working together to ensure that solar electric systems in Seattle are installed safely and provide maximum benefit to the owner.

If you are thinking of installing a solar electric system, keep in mind that, while solar electric systems offer unique rewards and can displace a portion of home or business electricity needs, energy efficient equipment and other improvements may provide a quicker path to lowering electric bills.

Solar electric systems may be operated independently or they may be interconnected with Seattle's electricity distribution system. Interconnected systems are often referred to as grid or line-tied systems. Seattle City Light has a net metering program available for systems up to 25 kilowatts that are interconnected to the grid. In a net metered system, a bi-directional utility meter displays the "net" difference between electricity produced and consumed by the customer. Figure 1 shows the basic system components.

In addition to reading this CAM, you may visit the DPD Applicant Services Center (ASC - see location details on page 5) to discuss with a permit specialist or land use planner specific code requirements and installation considerations for your project prior to beginning. Net metering and general solar-related questions can be directed to the SCL Conservation Helpline at (206) 684-3800.

Additional resources, including weblinks and phone numbers, are listed at the end of this CAM.

### PERMIT REQUIREMENTS

#### Electrical Permit

Electrical permits are required for all solar electric

systems. Most electrical permits may be obtained at the "Over-the-Counter" (OTC) permit area of the ASC. Property owners or licensed electrical contractors working for the owner may obtain the permit. Permit fees will vary depending on the size and complexity of the system. Technical questions may be directed to Electrical Technical Support at (206) 684-5383.

Seattle City Light also requires a Net Metering Agreement which is conditional on final approval of your electrical permit (see Interconnection and Net Metering Requirements below).

#### Building Permit

Building permits are only required for solar arrays (module assemblies) when:

- weight is 1,000 pounds or more;
- installation is structurally complex (as determined by DPD);
- solar projects are part of building alterations or additions valued over \$4,000; or
- solar projects require construction of stand alone support structures valued over \$4,000.

Building permits may be obtained at the ASC by first signing in to meet with a permit specialist.

### LAND USE REQUIREMENTS

The following information is excerpted from the Seattle Municipal Code (SMC), but does not substitute for complete information provided therein.

In general, alterations and additions to existing buildings must be permitted and conform to lot coverage, height and setback (yard) requirements described in the Land Use Code. Solar collectors are permitted outright as an accessory use. This means the collectors are incidental to and support the principal use of the lot, such as a home or business. Solar collectors are defined as "any device used to collect direct sunlight for use in the heating or cooling of a structure, domestic hot water, or swimming pool, or the generation of electricity" (SMC 23.44.046).

[www.seattle.gov/dpd](http://www.seattle.gov/dpd)



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The following information summarizes how solar collectors, and more particularly, solar electric systems, fit in with land use and zoning requirements. Solar greenhouses, also permitted under the SMC, are beyond the scope of this CAM, and are only addressed briefly. Specific questions about solar collectors, solar greenhouses and land use requirements can be addressed by contacting the DPD Public Resource Center (PRC) at (206) 684-8467, or by using our “Online Q&A Service” found online at [www.seattle.gov/dpd/research/qna/qform.asp](http://www.seattle.gov/dpd/research/qna/qform.asp)

### Nonconforming Residential Uses

A solar collector may be added to the existing principal building on a nonconforming residential lot without forcing the entire building to be brought up to current code standards (SMC 23.42.106).

### Lot Coverage Requirements

Solar collectors do not count as lot coverage if minimum standards are met, including but not limited to height and setback requirements. CAM 220, *Lot Coverage, Height and Yard Standards for Homes in Single Family Zones*, available at [www.seattle.gov/dpd/publications](http://www.seattle.gov/dpd/publications), provides details and illustrations.

### Height Requirements

In Single Family and Residential Small Lot zones, solar collectors may be mounted to extend up to 4 feet above the zone's height limit, or extend up to 4 feet above the ridge of a pitched roof. Also, the total height from existing grade to the top of the solar collectors may not extend more than 9 feet above the zone's height limit (see CAM 220).

In the Lowrise (multifamily) zone, and Commercial and Neighborhood Commercial zones with 30- or 40-foot height limits, and most shoreline-designated areas, solar collectors may not extend more than 4 feet above height limits (additional height for pitched roofs may not be counted in this measurement). In most other nonresidential zones and the Midrise and High-rise zones, solar collectors may extend up to 7 feet above height limits. However, in the nonresidential zones listed below, additional flexibility is provided.

### Additional Height Flexibility for Solar Collectors in Nonresidential Zones

*Applicable zones: Industrial, Commercial, Neighborhood Commercial, Downtown, International Special Review District, and Seattle Mixed zones; Urban Harborfront and Urban Stable shoreline-designated areas*

- Because many rooftops in nonresidential zones include a variety of mechanical and architectural features, solar collectors are treated just like those features. Solar collectors may extend up to 15 feet above the maximum height limit, so long as the combined total coverage of the rooftop features do not exceed 25% of the roof area when typical features (such as elevator penthouses) are present. If rooftop features exceed the 25% roof coverage, solar collectors may only extend 7 feet above maximum height limits (except in the Seattle Mixed zone).
- Additional height flexibility is available in the Seattle Mixed and Downtown zones, when screening and design considerations are met. Refer to SMC 23.48.010E and 23.49.008C for details.
- In the Pioneer Square Special Review District, solar collectors may extend to meet the height limit or exceed the roof height by 7, 8 or 15 feet, depending on whether various setbacks and rooftop coverage limits are met, subject to review by the District's Board. Refer to SMC 23.66.140 for details.

### Protecting Solar Access of Property to the North

In the Single Family and Residential Small Lot zones, a solar collector exceeding the zone height limit must be placed so that it does not shade the property to the north on Jan. 21 at noon any more than a structure built to the maximum permitted bulk for that zone. For assistance in determining solar exposure, please see CAM 417, *Sun Chart: Determination of Solar Exposure*, available at [www.seattle.gov/dpd/publications](http://www.seattle.gov/dpd/publications).

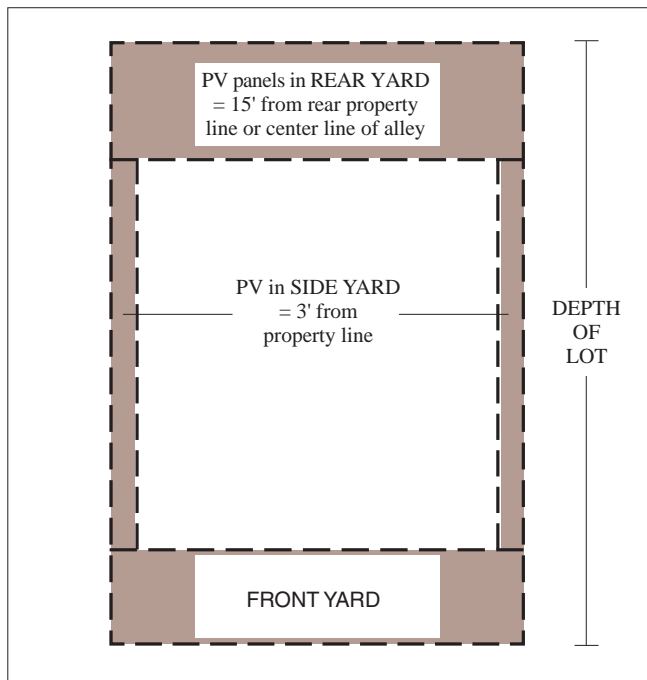
In most other zones, the applicant shall either locate a solar collector at least 10 feet from the north edge of the roof, or provide shadow diagrams to demonstrate the lack of additional shading on Jan. 21 as described above. However, this is not required in Downtown or Industrial zones.

### Setback (Yard) Requirements

Solar collectors may be located in yards according to the following conditions:

- In a side yard, up to 3 feet from the side property line.
- In a rear yard, up to 15 feet from the rear property line. When there is a dedicated alley the solar collector may up to 15 feet (10 feet in Residential Small Lot zones) from the centerline of the alley.
- Solar collectors are not permitted in a front yard, except for “solar greenhouses” that are integrated into the principal structure. Solar greenhouses

## Solar module setback requirements



are outside of the scope of this CAM—see DPD Director's Rule (DR) 2002-13.

- In Multifamily zones (Lowrise, Midrise, Highrise), solar collectors must be setback 3 feet from the side property line and 5 feet from any principal or accessory structure. The solar collectors in the rear setback must be a minimum of 5 feet from any principal or accessory structure.
- In Commercial and Neighborhood Commercial zones, solar collectors must be set back 5 feet from any principal or accessory structure. Where a lot line abuts a residentially zoned lot, such as Single Family or Multifamily, the required setback is a minimum of 3 feet.
- Other zones do not have specific yard-related setback requirements for solar collectors. However, applicants having projects in Special Review Districts (including Pioneer Square and the International District) should consult with the regulations in SMC 23.66.140C and 23.66.332C for setbacks when solar collectors are rooftop features.
- For additional information about regulations pertaining to greenhouses and sunshades in Multifamily zones, please refer to SMC 23.45.146.

## INTERCONNECTION AND NET METERING REQUIREMENTS

### Definitions

“Interconnection” refers to a customer-owned generation system operated in parallel with and connected to the SCL electricity grid for the purpose of offsetting part or all of a customer's electricity needs.

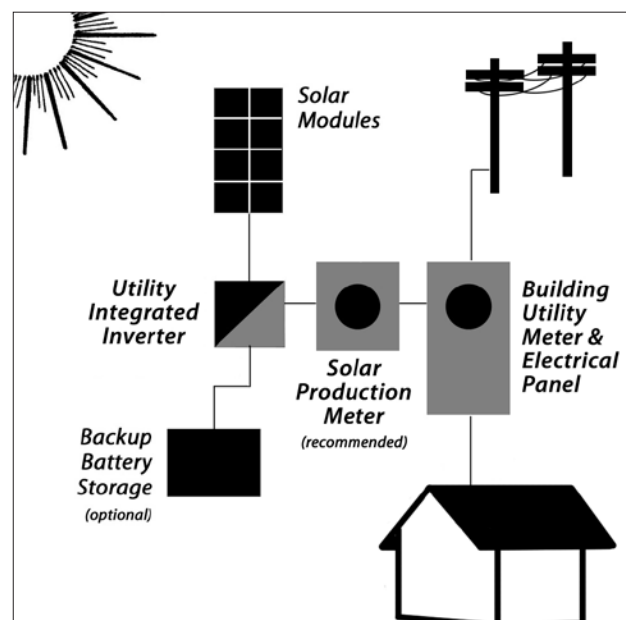
“Net metering” refers to an interconnected customer generation system with a meter that reads the “net” difference between the customer's electricity generation and electricity consumption. Any excess electricity generated by the customer during a billing period is credited on the customer's next bill.

### Net Metering Benefits

The advantage of interconnection and net metering, compared to solar electric systems operated independently of a utility grid, is that customers on the grid are assured of electricity needs being met year round regardless of solar availability and the size of system installed. In addition, the increased energy use and maintenance costs associated with battery storage are avoided.

Subject to certain limitations, customer-owned grid connected generating systems (solar, wind, hydro and fuel cell systems), 25 kilowatts (kW) or less, qualify for SCL's Net Metering program.

### Typical utility interconnected solar electric system (with optional backup battery storage)



## Net Metering Required Forms

To connect to SCL's grid, an Interconnection and Net Metering Agreement is required. The agreement holds SCL customers accountable for meeting specific interconnection and safety requirements. Customers are solely responsible for the proper installation and operation of solar electric systems. The system installation and operation must conform with all applicable codes, regulations and manufacturer's safety and operating manuals. A Net Metering Application and Compliance Form and a copy of the Interconnection Standards are also required and serve as Appendices A & B to the Agreement.

SCL Net Metering Information Packets include information about the program, including this CAM, and the required forms:

- Interconnection and Net Metering Agreement
- Net Metering Application and Compliance Form (Appendix A)
- Interconnection standards (Appendix B – found on the reverse of Appendix A)

Packets are available at the ASC or by calling SCL at one of the following numbers:

- SCL Conservation Helpline (206) 684-3800
- North Service Center (206) 615-0600
- South Service Center (206) 386-4200

## INSTALLATION CONSIDERATIONS

### Solar Access, Sizing and Performance

For good solar performance, your property should have clear unobstructed access to the sun (free of shading from roofs, trees and other landscape features) for most of the day and throughout the year. Solar module tilt angle and orientations that vary slightly from true south will not experience significant reduction in solar electric output.

The area required for modules depends on module efficiency, but is in the general range of 100 – 250 square feet per kilowatt (kW) installed. For this reason, most residential systems are sized less than 5 kW (5,000 watts). In the Seattle area, a site with good solar access may be expected to produce 1,000 kilowatt-hours (kWh) of electricity per year for each kilowatt (DC) of installed solar capacity.

A solar "tracking" mount boosts performance by about 15-20% but will add cost and complexity to the

system. Systems with batteries for backup power (during a utility outage) consume a small amount of power for charging the batteries.

### Mounting Solar Modules

Solar modules are typically mounted to south facing roofs for maximum solar exposure, although other configurations are possible. Depending on the type of system, modules may be mounted on roof jacks or racks (raised above the roof) or flush with the roof surface. Composition shingles are often the easiest to work with and slate roofs are the most difficult. Stainless steel hardware (5/16" lag bolts or similar) fastened to roof rafters with proper construction sealant to prevent leakage is common practice for securely mounting modules. Special mounting clips are available for raised seam metal roofs.

On flat roofs it is common to attach modules to a racking assembly mounted firmly to the roof's structure with modules tilted anywhere from horizontal (no tilt) up to 45 degrees. With multiple rows be sure to provide adequate spacing to avoid shading. A ballasted racking system designed to be held in place by weight alone is another option, though roof loading and structural analysis will be required.

Modules may also be placed in yards mounted to an accessory building or other support structure, including poles.

Solar modules come in a wide range of sizes but are generally easier to lift and handle than most framed windows. For safety's sake, avoid working in windy conditions.

**NOTE:** *The information provided above is general in nature and does not substitute for specific manufacturer guidelines or DPD permit requirements.*

### Structural Considerations

In general, provide a stable and durable connection to the roof structure for the size and weight of the components used. Take extra care to ensure a leak-proof installation. For unusual, complicated or heavy installations, consult an experienced building contractor or structural engineer.

If you are unsure about the structural integrity of your roof, or if it is in need of repair, have it professionally inspected to verify its condition and suitability. It may be necessary to make roofing improvements prior to mounting solar modules.



## Electrical Considerations

A safe electrical connection of solar equipment to an existing electrical service requires careful consideration and planning. Modifications to branch circuit wiring or the panel board may be necessary. Information about all changes to the electrical system must be included in the electric permit application. Be sure to follow all manufacturer installation instructions.

All components of the solar electric system, including modules and inverters, must be listed by a nationally recognized testing laboratory. Article 690 of the National Electrical Code has requirements specific to Solar Photovoltaic Systems. Seattle City Light's Interconnection Standards specify electrical requirements in greater detail. These standards are found at [www.seattle.gov/light/solar](http://www.seattle.gov/light/solar).

## Building Integration

Solar cells incorporated into building materials, such as roof shingles and insulated glass frames, often cost more than simple solar modules. These materials are known as "building-integrated photovoltaics" (or "BIPV"). The cost of BIPV materials is offset by the cost of ordinary materials that would have been used. Further discussion of BIPV applications is beyond the scope of this memo. Resources listed at the end of this document offer further information.

## Choosing a Contractor

Although individuals with the necessary construction and electrical experience are not prohibited from installing their own solar electric systems, using a licensed contractor is highly recommended. Considerations for selecting qualified contractors are:

- Do they have a business license?
- Are they licensed for the work you want them to do (mechanical, electrical, structural, etc.)?
- How long have they been in business?
- How many solar electric systems have they installed?
- Will they provide references?
- Have they attended manufacturer, trade association, or other training on solar electric installations?

A complete bid for a job will include the total cost of getting a system up and running, including all equipment, wiring, installation, grid connection, permits, sales tax,\* and warranty.

\*Effective July 1, 2001, Washington state sales tax was eliminated for qualifying solar electric systems.

## Potential Financial Incentives

In addition to sales tax savings, effective July 1, 2005, the Washington state legislature authorized utility companies to make incentive payments to their utility customers for renewable power installations. The utility is then permitted to reduce its tax liability by the amount of the incentive payments made to its customers. Contact SCL for the most up-to-date information about this new program.

Beginning in 2006, federal income tax benefits may be available for solar installations and could offset a portion of your installation costs. Consult your tax professional for details.

## FOR FURTHER ASSISTANCE

### DPD Applicant Services Center

*Permit application and issuance, plan review*

20th floor of Seattle Municipal Tower  
700 Fifth Ave., Seattle  
(206) 684-8850

[www.seattle.gov/dpd/asc](http://www.seattle.gov/dpd/asc)

### DPD Public Resource Center

*Permit history and research, publications, self-help computer terminals*

20th floor of Seattle Municipal Tower  
700 Fifth Ave., Seattle  
(206) 684-8467

[www.seattle.gov/dpd/prc](http://www.seattle.gov/dpd/prc)

### DPD Client Assistance Memos (CAMs)

- CAM #220, *Lot Coverage, Height and Yard Standards for Homes in Single Family Zones*
- CAM #316, *Subject-to-Field-Inspection (STFI) Permits*
- CAM # 417, *Sun Chart: Determination of Solar Exposure*

[www.seattle.gov/dpd/publications](http://www.seattle.gov/dpd/publications)

### DPD Director's Rules

DR 13-2002, *Solar Collectors: Eligibility Criteria and System Efficiency Requirements*

[www.seattle.gov/dpd/codes](http://www.seattle.gov/dpd/codes)

## SCL Conservation Resources Division

- *Information, technical assistance and financial incentives for customers interested in improving home or business energy efficiency and saving money on their electricity bill.*
- *Green Power purchase options*
- *Net Metering packets*

Residential and small businesses ("Conservation Helpline") – (206) 684-3800

Medium and large businesses – (206) 684-3254

**[www.seattle.gov/light/conserve](http://www.seattle.gov/light/conserve)**

## SCL Service Centers

*Interconnection and net metering assistance; Net Metering packets*

### SCL North Service Center

*(for projects north of Denny Regrade)*  
1300 N 97th St., Seattle  
(206) 615-0600

### SCL South Service Center

*(for projects south of Denny Regrade)*  
3613 Fifth Ave. S, Seattle  
(206) 386-4200

## Northwest Solar Center

*A program of the WSU Cooperative Extension Energy Program, the Center provides free education, training and technical assistance services to SCL customers. The Washington State Photovoltaics Industry Directory and other resources are posted on the web.*

(206) 396-8446

**[www.northwestsolarcenter.org](http://www.northwestsolarcenter.org)**

## Solar Washington

*The local chapter of the American Solar Energy Society, which promotes the development and effective use of solar and renewable energy through education and training. Events, articles, newsletter and links are posted on the web.*

**[www.solarwashington.org](http://www.solarwashington.org)**

## US Department of Energy—Energy Efficiency and Renewable Energy

*This division of the Department of Energy has a focus on enhancing renewable and sustainable energy production. Their web site provides a wealth of information and links to information on types of energy, state information, funding and a consumer guide.*

**[www.eere.energy.gov](http://www.eere.energy.gov)**

## Access to Information

Links to electronic versions of DPD **Client Assistance Memos (CAMs), codes, and forms** are available on the "Publications" and "Codes" pages of our website at **[www.seattle.gov/dpd](http://www.seattle.gov/dpd)**. Paper copies of these documents are available from our Public Resource Center, located on the 20th floor of Seattle Municipal Tower at 700 Fifth Ave. in downtown Seattle, (206) 684-8467.